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FOREST RESEARCH NOTES

U.S.DEPARTMENT OF AGRICULTURE
FOREST SERVICE
CALIFORNIA FOREST AND RANGE
EXPERIMENT STATION *

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Research Note No. 31

June 1, 1943

WATERING PLANTATION TREES 1/

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ROCKY MOUNTAIN STATION

by

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Low survival of forest planting stock has long been a serious obstacle to successful planting in regions of dry summer climate, such as the slopes of the Sierra Nevada in California, where the total rainfall for June, July, and August averages less than 3/4 of an inch. However, once established in this locality, planted trees make notably rapid growth. To assure survival of experimental trees the Institute of Forest Genetics has watered its plantations for the first few years after planting. This watering has resulted in 85 to 98 percent survival as compared with 5 to 20 percent survival in nearby farmers' plantations where no watering was done. These favorable results indicate that watering may be a practical measure for farm, park, windbreak, erosion control, camouflage, and other intensive plantings.

To determine minimum and adequate watering requirements, a pilot test was established, the 5-year results of which are now available. Two plots were planted on April 1, 1938, with 2-year-old ponderosa pine trees, 120 trees on each plot. One plot was on a moderately dry site at an altitude of 2,700 feet and the other was on a severely dry site at an altitude of 950 feet, which is close to the lower limit of natural ponderosa pine range in this locality. All the trees were watered at the time of planting. Thereafter one-fourth of the trees received no water whatever; one-fourth were watered once in midsummer; one-fourth received two summer waterings; and the remaining one-fourth received five summer waterings at intervals of 3 to 4 weeks beginning in early June. Seven gallons of water were applied per tree at each watering, the water being poured from buckets into basins formed with earth at the base of each tree. No plot was watered after the first summer.

1/ This note is a digest of a longer article, Results of a Test of Watering Plantation Trees, by R. H. Weidman and C. R. Berriman, which is to be published in the near future.

* MAINTAINED AT BERKELEY, CALIFORNIA, IN COOPERATION WITH THE UNIVERSITY OF CALIFORNIA.

Observation of the plots indicated that practically all the mortality of trees in the plots was due to drought. Table 1 shows that most of it occurred during the first year, little the second, and none thereafter. The results show further that there was no important difference in the survival of trees watered once and those watered twice, and that such infrequent waterings had but slight advantage over no watering whatever. Where five waterings were given, however, the survival was satisfactory for both plots and would doubtless have been higher at the dry Bassi location if the waterings had been better timed. The results show definitely that no watering need be done after the first year to insure survival.

Table 1.- Effect of different watering treatments on survival of ponderosa pine[1/]

Location and altitude of plot	Year of survival count (taken each fall)	Treatment and survival: Number of times watered during the first summer			
		None	One	Two	Five
	Year	Percent	Percent	Percent	Percent
Institute - altitude 2,700 feet	First	77	83	87	100
	Second[2/]	-	-	-	-
	Third	70	80	77	97
	Fourth	70	80	77	97
	Fifth	70	80	77	97
Bassi[3/] altitude 950 feet	First	33	40	43	83
	Second	23	30	33	83
	Third	23	30	33	83
	Fourth	23	30	33	83

1/ On the basis of 120 trees planted in each plot.
2/ No survival records were available for the second year.
3/ The Bassi plot was discontinued at the end of the fourth year.

Height measurements showed that the average growth of trees watered five times was appreciably greater than that of trees that received less water. The trees watered only once or twice showed little difference in height as compared with each other or with those not watered at all.

Another feature of the experiment was the mulching of half of the trees with pine litter in an effort to conserve moisture. For the trees watered once or twice, this treatment increased survival 13 to 20 percent as compared with no mulching. Where intensive watering was done the survival was high regardless of mulching.

Whether plantation trees need watering to assure high survival depends chiefly on the distribution and amount of rainfall during the first growing season. Another important factor is water-holding capacity of the soil. With these points in mind the quantity and intervals to be used in artificial watering depend on seasonal need. By digging holes from time to time during the summer to the depth at which absorbing root tips are located, it is possible to judge approximately by the color and feel of the soil the time to apply water.

It is not intended, of course, from this limited pilot test to suggest the watering or irrigation of extensive State or national-forest plantations. There are forest plantings of a more intensive nature, however, in connection with farm forestry, windbreaks, erosion control, municipal watersheds, and similar projects, where watering the first year would be possible and profitable.